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RAILWAY RATE THEORY AND PRACTICE IN THE LIGHT OF RIPLEY'S "RAILROADS"[1]

THE seventy-five years or so that have intervened between the publication of Henry Fairbairn's *Treatise on Political Economy of Railways* (1836) and of W. Z. Ripley's *Railroads* (1912, 1915) have been replete with attempts to discuss one or another of the problems connected with the development of railway transportation. Though many of these attempts have resulted in but ephemeral productions of practically negligible scientific value, the record is redeemed by the work of men like Sax, Cohn, Colson, Picard, Lardner, Acworth and others. Among those that have been successful in achieving distinction, the little volume on *Railroad Transportation* by A. T. Hadley still maintains a position of leadership, and with this production of an American scholar one compares, instinctively, the recent volumes of Professor Ripley.

Writing a generation after Hadley, Ripley has been fortunate in having at his disposal a mass of data, largely arising out of the activities of Congress and of its instrument, the Interstate Commerce Commission, that has enabled him to illuminate his discussion with an almost overpowering wealth of illustration. His pages show an admirable acquaintance with the American literature of railway economics, but draw little upon the corresponding European literature. In connection with this fact may be noted one great difference between Hadley's treatment and that of Ripley. To Hadley the problems of railway transportation were international, so to speak: to Ripley they are national, and he feels competent, therefore, to interpret them with little or no reference to the experience of other countries. No doubt there is some justification for Ripley's restriction of his field of survey, though the titles of his volumes by no means indicate this; but it must be recognized that the gain of minuter analysis is secured at the loss of that broader understanding of the railway problems of this country to be obtained from the comparative study of the economic status of other national systems. The opportunity for such a study, moreover, was an attractive one. The sources open to Hadley had been vastly enriched by the writings of Colson, Hamon, Leygue, Milhaud, Varret and Guyot in France; of Kupka, Neményi, Hüber, von Weichs-Glohn, Rank, von Kaufman, Ulrich, Lotz, Cohn, Grunzel and Kech in Germany and Austria; of Tajani and Jonnelli in Italy, to say nothing of the work of numerous others. Professor Ripley's right of choice must be admitted, but may it be permitted to regret the choice made? Moreover, if his work is to be regarded as a general treatise on the economic and social problems of railway transportation, there are some conspicuous omissions. In spite of numerous previous attempts, there was still ample room for careful discussion of the theory of state control in railway management, and of the problem of actual management of the railway industry by the government. Excellent as is the author's treatment of the history of federal regulation in the United States, one cannot help but wonder why he should have neglected, so markedly in his first volume, the part played in railway regulation by the individual commonwealths. Yet, if the scope of treatment is open to criticism, there is, on the other hand, much to be said in praise of the manner in which the topics undertaken are handled. Rate discriminations, the rate structure, federal legislation and regulation, railway capitalization and financial policy, railway coöperation, are all discussed for the United States with a copiousness of appropriate detail that will secure for the treatise a prominent place in the permanent literature of railway economics. Not that Ripley is to be regarded as a discoverer of new principles; his conspicuous merits, indeed, are those of the recorder and interpreter. But he has assimilated, with uncommon skill, the discouragingly scattered sources of information, and has presented them in a way that wins appreciation, even where, here and there, it does not carry conviction. Future investigators into the economic problems of American railway transportation will be deeply indebted to him for the solid foundation that he has provided for their further researches.

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[1] Railroads. By William Z. Ripley. New York, Longmans, Green and Company, 1915.—xix, 638 pp. The writer of the following review hopes to supplement it with a further one in which will be discussed the problem of regulation as presented by Professor Ripley in his recent work.

In what is, indubitably, the most important part of railway economics, the theory of rate-making, Ripley's predecessors had still left much to be done. The theory of rate-making is part and parcel of the theory of prices in general, one of the most interesting divisions of the science of political economy. But while the theory of prices is comparatively simple when based upon hypotheses of single production and perfectly free competition, it becomes highly complex when the suppositions of joint cost or monopoly are introduced. Such complexities, present to a high degree in the phenomena of railway prices, account, no doubt, for the slow progress in scientific analysis that has been made. In this part of the field, Hadley's work, excellent though it was, can hardly be regarded as more than rough pioneering. Yet the disposition was to accept his explanation of the principles of rate-making as sufficient; it had the merits of simplicity and clearness. The more unquestioned Hadley's theory was, the greater the barrier it proved to that intensive examination of the underlying factors of railway price-making, out of which alone a really satisfactory theory could be evolved. Hadley's essay has been supplemented by the special analyses of several economists, attracted, in passing, by the problem of railway rates; but contributions such as those of Taussig, Lorenz, M. H. Robinson, J. M. Clark and Edgeworth, illuminating even when their logic is not always entirely acceptable, fail to present a rounded-out theory of railway rates. Nor can it be said that the specialists in railway economics, writers like Acworth, Johnson, Noyes, Newcomb and others, have been more successful. However, one must not fail to recognize that the work done by all of these represents important and necessary preliminary surveys. To continue the surveying metaphor, the task left to Ripley was the determination of the line of actual location, the reduction of a grade in one place, the easing-out of a curve in another, perhaps the substitution of a more direct route in still another place, all this demanding close and careful examination and the constant exercise of a matured and balanced judgment. Needless to say, the task has been performed with considerable success. The fact that this review lays emphasis upon points of criticism rather than of approval must not allow the general excellence of Ripley's work to be underestimated.

From the point of view of price-making, the railway may be either competitive or monopolistic. Ordinarily it is not a perfect example of either, and, for that reason, it has often been termed a partial monopoly. As to whether, on the whole, the railway is more competitive than it is monopolistic, or vice versa, is a question requiring nice consideration. Perhaps the public at large is apt to credit the railway with even more monopolistic power than it possesses, not recognizing that while adjustability of railway rates may indicate monopoly, it may be, in part at least, nothing more than the result of the production of different services of transportation at joint cost. However, the significant fact for our present discussion is that both competitive and monopolistic influences tend to enter into the price-making of the railway, and that, in so far as the former are effective, the railway rate tends towards the cost of production of the service covered by it, and, in so far as the latter are effective, the rate tends towards the maximum demand price of the user of the service.

Approaching the problem from the first-named side, one is immediately confronted with the necessity of examining costs of production —in other words, the nature of railway expenditures.

There are two important questions that arise in connection with railway expenditures. Do they increase uniformly with the increase of traffic? Are they distinct and separable with respect to the various services of transportation, or are they joint and inseparable to any degree? To the former of these questions Professor Ripley addresses himself first. In any industry requiring the use of capital goods, a certain proportion of the total expenditures consists of interest and other fixed charges upon the capital, which, within the capacity of the plant as established, do not vary, closely at any rate, with the amount of goods produced. Besides these so-called "fixed" charges, there are certain operating expenses that respond more or less slowly to the oscillations of productive activity, notably, those connected with the general supervision of the establishment and general maintenance of the plant. Both of these kinds of expenditure may be roughly described as "constant." Their relative amount as compared with the remaining variable expenses depends upon the nature of the business. Several writers, Sax, Acworth, Eaton and others, have made estimates of the proportion of constant expenditures in the railway industry. Quite commonly such estimates are lacking in precise and detailed analysis, very frequently arising from the absence of an intimate and practical knowledge of the real nature of railroad expenditures, so that their accuracy is open to doubt. Professor Ripley's analysis brings out clearly enough the fact that important proportions of maintenance and transportation expenditures may be properly regarded at any given time as "constant," but, with due respect to the interesting presentation, his estimate is of no particular statistical value since it is not worked out in sufficient detail to justify the precise ratio of "constant" to "variable" expenses, two to one, that he choses to adopt. Not that this estimate is an improbable one. It is in substantial agreement with those of Shirley Eaton, an experienced railway statistician, and Julius Kruttschnitt, a prominent railway executive. A generation or more ago, Emil Sax placed the ratio at three to one, but Sax was basing his figures on European railway experience of his day which found capital investment comparatively high, traffic comparatively scanty, and operating expenses comparatively low. Ripley does not discuss Sax's estimate, however, though it affords a convenient opportunity of pointing out that the ratio of constant to variable expenses may be affected by the size of the fixed capital investment, the density of traffic and the general level of interest as compared with the levels of prices and of wages.[1]

The influence of the "constant" factor upon actual rate-making lies in the fact that traffic, unsecurable at average rates, may be taken at less than those rates if no change in the amount of the fixed charges is caused thereby and if all additional operating expenses are covered. Actually, there will be no inducement to accept such traffic unless it will be able to more than cover these out-of-pocket expenses, unless, indeed, anticipated expansion of traffic promises, by its effect upon operating costs, to provide an appreciable contribution towards capital expenses at an early date. The acceptance, at low rates, of business otherwise unremunerative benefits traffic previously secured to the extent that the burden of charge upon the latter is mitigated, and concessions in rates thereby made practicable. Of course, it is conceivable that effective monopoly may reduce the unwillingness of the railroad to make these concessions, though, even under these conditions, the chance of reduced rates fostering the development of the old traffic so as to give increased profits will be very influential in predisposing traffic managers towards concessions on previously established rates.

But successive increments of new traffic will finally bring the railroad to the saturation point of utilization of its already invested capital. Expansion of track, yard and station facilities, as well as of equipment, becomes necessary. Generally speaking, expansion is made before the complete saturation point is reached, for, if the writer is not mistaken, the unit cost of transportation service tends to increase during the period of growing congestion that leads to the point of theoretically complete saturation. Thus pressure is automatically brought to bear upon the railroad managers to provide additional facilities. A reduction of transportation costs at once ensues, which may be so extensive as even to take care of the charges upon the new capital. But if this is not achieved, the increased traffic capacity of the railroad makes feasible the stimulation of traffic by low rates which, as already indicated, assist in bearing the burden of the capital charges by the difference between the revenue that they produce and the (probably reduced) transportation expenses (brought about by the enlarged scale of operation).

Professor Ripley's explanation of the influence of the "constant" element of railway expenditure upon rate-making is in harmony with the foregoing statement, though he seems to fail somewhat in emphasizing sufficiently the important bearing, upon the general rate level, of the tendency towards greater economy of operation produced by the increased density of traffic that results from the additional business secured by the discriminatory rates. However, he presents the facts from which this is deducible.

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[1] He deals with the variation of the "relative distribution of outgo" as between different railroads, and on the same railroad as between different years, but his attention seems to be concentrated entirely on operating expenses.

Some nine years ago, Mr. M. O. Lorenz contributed to the *Quarterly Journal of Economics*[1] a short article on "Constant and Variable Railroad Expenditures and the Distance Tariff," in which was included a table comparing, by index numbers, the growth of ton mileage, passenger mileage, earnings and total operating expenses, with that of the different departmental operating expenses for the period 1895–1906, both years inclusive. This table hardly seems to bear out the usual notion as to the relation of constant to variable expenses. Maintenance of way and structures seems to be a more variable expense than that of conducting transportation; and maintenance of equipment expenditures shows a growth considerably in excess of the increase of traffic. By reason of a change in the details of the accounts, Mr. Ripley finds it impracticable to extend the comparison beyond 1906, though, by the way, the year 1907 might have been added, as these changes did not affect the returns of that year. He expresses the hope that, with the revised statistics, it will be possible, in the course of time, to secure a clearer definition of the relationship of operating expenditures to the growth of traffic. Out of curiosity the writer has had calculated the index numbers, for the period from 1908 to 1913 inclusive, for four leading railroads of markedly different economic environment.[2] The figures are too limited in scope to prove anything of importance, but it is interesting to note that, so far as they go, these statistics which, according to the new methods of reporting, distinguish somewhat more effectively (at any rate in the matter of equipment) maintenance from additions and betterments, still fail to reveal that very marked influence of the "constant" factor which one naturally expects to find.

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[1] Vol. 21, p. 283.

[2] Acknowledgment is due to Mr. C. Y. Hsü, a graduate student, for the calculations upon which the table is based. The results of the calculations are set forth in the table on the following page.

	TON MILES	PASSENGER MILES	MAINTENANCE OF WAY AND STRUCTURES	MAINTENANCE OF EQUIPMENT	CONDUCTING TRANSPORTATION	GENERAL EXPENSES
All Railways (U. S.) Lorenz						
1895 . .	100	100	100	100	100	100
1906 . .	254	206.5	216	288.8	194	166
New York Central and Hudson River R. R.						
1908 . .	268	296	248	304	202	202
1913 . .	340	395	385	530	257	303
Southern R. R.						
1908 . .	310	340	219	477	334	134
1913 . .	415	472	286	590	388	175
Illinois Central R. R.						
1908 . .	380	300	258	435	262	274
1913 . .	465	364	336	640	367	328
Great Northern R. R.						
1908 . .	383	580	400	670	371	105
1913 . .	450	899	520	770	485	150

In the department of maintenance of way and structures some amount of capital expenditure is still likely to find a place among operating expenses; but, in the case of maintenance of equipment, the error caused by this practice should be minimized since 1907 by the revised statistics. Yet remarkable variability still reveals itself, apparently, in all departments. However, Ripley points out that such a table as that of Lorenz is difficult of interpretation, not only by reason of the probability of the inclusion of considerable expenditures for future growth in its operating figures, but also by reason of the disturbance created by increased prices of materials and wages of labor. He could also have mentioned the possibility of deferred maintenance being made good by the operating expenditures of prosperous periods. Attention might also have been drawn to the fact that the basis of comparison changes. New lines and additional branches are added to the original mileage and, for a while, these are apt to swell operating expenditures more than in proportion to the increase of traffic.

Undoubtedly, there is considerable inelasticity in operating expenditures over short periods and for moderate variation in the amount of traffic, but the above figures, even when corrected, seem likely to point to a large degree of elasticity over longer periods and for more important variations in the amount of traffic. To the extent that this is so, the so-called " constant " element of operating expenditures should not be allowed, in the interests of the railway itself, to exercise too marked an influence upon railway rates, except in so far as these are special and temporary. Of course this does not interfere with the effect of that element of constant expenditure represented in fixed charges, whose influence on the rate-making may be very marked on account of the long period which may ensue before the capital investment corresponding to these charges is fully utilized.

In further analysis of the nature of railway expenditures, an interesting question arises as to the extent to which they give rise to increasing returns. Professor Ripley discards the idea that marked economies of large-scale production characterize railroad operation. The law of increasing returns applies, nevertheless, because fixed charges up to a given point of saturation tend to remain constant, thereby becoming proportionately less as the volume of business expands. Of course the significance of the qualification in the phrase " marked economies " is somewhat vague, but there is little doubt in the mind of the writer that the economies are very appreciable. The whole record of railway performance seems to point to this. Indeed, in one of his tables Ripley quotes figures for a period of twenty-six years (1880–1906) showing that rather less than a fourfold increase in operating expenses brought about from five to sixfold an increase in traffic units. Strictly speaking, the comparison of the increase of traffic units should be made with the increase not merely of operating costs, but of these plus the fixed charges that represent the cost of capital, in accordance with the accepted definition that the law of increasing returns holds good whenever successive applications of capital and labor result in a more than proportionate increase in the product. If this had been done in the case of Ripley's table, and corrections had been made for increases in the scales of prices and wages, there is little doubt that increasing returns would be still more distinctly marked.

A question arises as to the propriety of regarding the railroad industry as an instance of increasing returns if such returns are to be regarded as merely the reflection of the fiscal conditions attaching to heavy capital investment. If Ripley is justified in this, then any industry that shows, over a period of years, a decided tendency towards constant cost may, nevertheless, be classed as one of increasing returns, because of the fact that its capital, being impossible of application in a more or less continuous series of doses, necessarily finds its charges per unit of production diminished as the previously unutilized productive capacity of each large investment is taken up.

This is not a terminological quibble. It may be conceded that the fiscal phenomenon is important in its influence upon current rate-making, but it is still more important to know whether the successive installments of capital and labor, applied in the manufacture of transportation, tend to increase in productive efficiency. Upon this depends the possibility, among other things, of permanently lower rates or of permanently superior service at the same rates.

But if Ripley's interpretation of the law of increasing returns as applied to the railway industry is doubtful, so also is his explanation of the law as applying to long-haul traffic. A decreasing cost per ton-mile is usually accepted as marking very distinctly an increasing length of haul by railway transportation. Ripley puts it as follows:

> The terminal expense is obviously quite independent of the length of the haul. It costs no more to load for a carriage of 3000 miles than for one between two adjoining stations. . . . The constant terminal expense, spread evenly over the mileage traversed as the movement expenses grow, becomes progressively less and less in proportion to the total of the two, which constitutes the real rate. The longer the haul, the lower the ton-mile cost as a matter of necessity.

This is quite conservative doctrine, commonly agreed to without reserve by both economists and railway men. Yet can it be accepted without considerable limitations? Ripley may show that, with assumptions of fifty cents per ton for terminal costs and one-half cent per ton per mile for movement costs, a ten-mile haul works out at 5.5 cents per ton-mile, while a five-hundred-mile haul works out only at 0.6 cents, but he omits to point out that if the five-hundred-mile haul were cut in two, the average would be only 0.7 cents, or, if it were doubled, the average would still be 0.55 cents. The influence of terminal costs, applied even in his own way, would be a modest one upon haulage ranging from moderate to long distances. The reason why long hauls have shown such amazing economy over hauls of moderately long to long distance has been not so much the difference in distance, minimizing the pro-rated fraction of terminal costs, but the fact that these long hauls have been commonly associated with the movement of traffic in large quantities, heavy train loads. There is another objection to be raised against too free an acceptance of the current idea. Three-fourths or so of freight traffic on the railroads of this country consists of car-load consignments. The terminal handling expenses of this carload freight that fall upon the railroads are small, since it is customary for the consignors and consignees to load and unload at their own expense.[1] There is, of course, the handling of the cars from and to team and industrial tracks, and the assembly into and distribution from trains, but, in so far as the cars are consigned to distant points, they will have to pass through division terminals, say every two hundred miles or so (except where lightness of traffic throws division yards farther apart), and in the majority of cases there will be additional handling of the train, involving new "terminal" expenses. It may be that these divisional yard expenses en route are not so heavy as the initial or final "terminal" expenses, where the latter are incurred in large, traffic-congested centers, but to the extent to which they are incurred, roughly in proportion to distance, they minimize the depressing influence of the so-called "terminal" expenses upon long-haulage costs as compared with those of short-haulage.

Overemphasis of the relation of the law of increasing returns, as Dr. Ripley applies it to long-haul traffic, weakens part of his argument in connection with market competition. Such competition, he remarks, is facilitated by the fact that the carrier is "able to exercise a wide range of choice in fixing that margin of value created which it reserves for itself." At all times, primarily by reason of its subjection to the law of increasing returns, this intermediate share of the carrier tends to adjust or accommodate itself to the end that it may discover or produce a wider margin between values in the hands of producer and consumer. In other words, "the greater the distance between the producer and consumer, the greater the possible margin of place value remaining as its individual share." Literally construed, Mr. Ripley's language is not open to objection since he speaks of this as a possibility; and that it is possible for a supra-normal rate of profit to enure to specific long-distance traffic is not to be denied. But the average reader will be apt to gain the impression that, without regard to economical production, the railways seek to maximize their own profits by *unduly* stimulating traffic at a distance. As the above discussion indicates, there is by no means a prima-facie case for such a contention, at least so far as the great bulk of railroad traffic is concerned.

In the consideration of the railway-rate problem from the aspect of the costs of production a second question presents itself, namely, as already stated, whether the expenditures incurred to produce the various services are distinct and separable or, to a greater or less degree, joint and inseparable. Some twenty-four years have elapsed since Taussig published his memorable article dealing with this question. Like his colleague, Ripley accepts the traditional examples of wool and mutton, gas and coke etc., as representing typical instances of joint costs. He goes on to point out that the railroad is hardly an example of joint costs in the same sense, inasmuch as the increase of any one kind of transportation, say that of coal, does not produce necessarily an increase of any other, say cotton, but, nevertheless, he insists that

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[1] The case of the less important less-than-carload traffic is different inasmuch as all loading and unloading expenses are borne by the railroad.

> the general law of joint costs holds good, in that it is a demand for each service rather than its costs which finally determines the chargeable rate. This must be so, because of the fact that the cost of each shipment is so largely joint and indeterminate and that a large part of the entire plant is indistinguishably devoted to the general production of transportation without reference to particular units of business.

Strictly analyzed, the argument does not appear convincing, even though the conclusion be not unacceptable. It might be urged that the joint and indeterminate costs are really no other than "common" costs, no more inseparable, theoretically, than the common costs of the production of two distinct articles that happen, for the sake of convenience, to be produced together in the same factory. Given free competition, the normal price of each of the commodities would be determined by normal cost of production, and the mere accident of producing them together cannot alter this relationship of price to cost. To quote Professor Edgeworth:

> If the same ground is equally suitable for peas and beans—joint effects in the way of rotation of crops being abstracted—then if the prime costs (in the sense explained) of (properly assigned) units of peas and beans are the same, the same will be the selling price for peas and beans of units (so assigned). The orthodox economist stating this familiar doctrine would not be put off by the affirmation that a great part of the cost was indeterminate, being joint for all the products in large part; that it is impossible to *allocate* the amount proper to each product.[1]

If the restriction of competition, made inevitable in the railway industry by the limitation of the factor "land," could be removed, prices of railway transportation would be found to tend always towards normal cost of production. Thus, the presence of monopolistic conditions, not of production at joint costs, causes actual railway rates to be adjusted to consumers' marginal utility rather than to producers' costs. This view of the nature of production in the case of the railway is borne out by the fact that "joint," as distinguished from "common," production exists only "when two or more things are produced by one and the same process, so that the expenses of producing them all together are not greater than the expenses of producing one of them alone would be."[1] Only to an insignificant extent can the production of transportation be said to exemplify such "jointness." Such is the objection that might be urged.

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[1] *Economic Journal*, 1913, p. 221.

However, as the reviewer has pointed out in another place,[2] the definition of joint cost that has been handed down to us from the classical economists is itself, perhaps, open to criticism as substituting for the general case of joint production merely an important sub-case. It is rash to advise the oracles, but may it be suggested that an appropriate statement of the general law would allow joint cost to be operative whenever the total costs of production of two or more commodities produced together by a single plant are less than would be the sum of the costs of their separate production by separate plants. Granted such a definition, the attribution of discriminatory charges to conditions of "joint" production becomes, theoretically, more acceptable. However, actual rates may be other than those that would be established by joint cost under conditions of competition, for the super-imposition of monopoly upon joint production may bring about readjustment of total supply with possible reaction upon the price relations.

The acceptance of the above definition of joint costs would fail to meet the views of a critic such as Pigou. He would maintain that the service of railway transportation could not in any case be regarded as jointly produced, for "joint" costs imply two or more separate commodities—an article cannot be produced "jointly" with itself—and the service of transportation, the carriage of tons of different things between X and Y, is a single, homogeneous commodity. Such a contention must not be accepted too readily. To the extent that the carriage of tons of A, B and C, between X and Y, involves varying proportions of capital goods and labor per unit of transportation produced, differences in business risks and diverse degrees of managerial skill, the existence of economically distinct services of transportation would seem to be indicated. Certainly this applies as between the carriage of bananas and coal, though it may not do so as between coal and iron ore. In so far as this applies, the service of transport is not technically homogeneous. Professor Taussig would go further and urge that, where technical homogeneity is present, the commodity becomes economically differentiated if the demand schedules are different, and proceeds to urge that the heterogeneity of demand in the case of the railway service establishes that differentiation of commodities upon which the operation of the law of joint costs may be predicted.[1] But, under conditions of free competition, would the demand schedules for the transport of coal and of iron ore between X and Y be differentiated? Is it not, possibly, the discrimination of monopoly, not of joint supply, that produces the effect of a stratification of demand? In order to reason back to differentiation of commodity (or service) and to joint supply, it would be necessary to establish that actual price (rate) discriminations were not primarily the results of monopoly.[2]

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[1] A. Marshall. Principles, 2nd ed. p. 437.

[2] *American Economic Review*, Vol. 4. No. 1. Supplement, p. 89.

The task of establishing economic heterogeneity where technical homogeneity exists is far from easy, and requires much more intensive analysis of railway rate practice than has yet been given to it by the economist. But there is reason to hope that a careful analysis would be fruitful of results. There are areas and periods at and during which the rivalry of railway carriers has surely minimized the influence of the monopolistic factor, and yet widely differentiated rates for different commodities have persisted. The reviewer believes it to be possible by a careful study of the details of such cases to give strength to the argument that monopoly, though at times affording the only explanation of specific rate discriminations, is by no means to be regarded as providing a satisfactory general explanation. Ripley had the misfortune to complete his first volume, and with it his discussion of joint costs, before the appearance of Pigou's *Wealth and Welfare* or of the correspondence in the Pigou-Taussig controversy, or of Edgeworth's review of Pigou. The critical value of Professor Ripley's discussion of joint costs is less than it would have been, no doubt, had this not been the case. Yet such of Edgeworth's articles entitled "Contributions to the Theory of Railway Rates" as appeared during 1911, together with certain earlier writings of his, might well have stimulated a closer inquiry into the relative significance of joint production and monopoly in the determination of railway rates.

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[1] *Quarterly Journal of Economics*. Vol. 27, p. 381.

[2] The same necessity applies in connection with Professor Seligman's conclusion that the transport of silk and of cotton falls under joint cost because the technically homogeneous place utility that is produced attaches in various degrees to different articles and thus completes their production in an economic sense. (See letter of Seligman, *Quarterly Journal of Economics*, vol. 21, p. 156).

It is quite practicable to discuss, under the head of "joint costs," the oyster case made famous in Hadley's *Railroad Transportation*, which Ripley uses as the foundation of his chapter on local discrimination. His analysis falls under two heads: (1) where the intermediate point X is on a circuitous route between Y and P; and (2) where it is on the direct route. The conclusion reached is that, since the danger of local rates at X being actually enhanced, or at least prevented from reduction, because of an unduly low level of competitive rates at more distant points, is much greater when X is a way station on the direct route than when it is an intermediate point on a roundabout route, therefore the direct line through X is, at the outset, put to a justification of its local tariffs as to whether they are inherently reasonable or not: first, by comparison with the general level throughout the surrounding country; and secondly, as yielding a return on the capital actually invested. It must be noted, however, that in his elaboration of the Hadley illustration, Ripley goes considerably beyond the original assumptions. Hadley abstains from the complications arising out of considerations as to the competition of the two routes at Y or as to their relative strength in the determination of the rate from Y. The vital issue in the case outlined by Hadley is simply that of the justification of the policy of the railroad in charging discriminatory rates upon different consignments of the same commodity at X, to be handled in identically the same fashion. This is the familiar problem as presented, for instance, in the case of the import and domestic rates.

Obviously, if the two identical consignments both originated from X, there would be no question of applying different rates to them for the same service. Does the fact that one of these commodities originates at another point than X, namely Y, mark it as economically a different commodity and thereby give some color of justification to the difference in treatment? Certainly, the value of the service is different to the owners of the two commodities. To X oystergrowers the service is worth a dollar per hundred pounds, because that price will enable them to compete at P, but to Y oystergrowers, sending their product to X for shipment by rail, it is worth not more than 75 cents per hundred pounds, because it costs them 25 cents to convey their oysters from Y to X. The demand schedules for what are technically identical services of transportation are dissimilar, and it is because of this fact that the discrimination in rates is justifiable. Since the distinct demand schedules constitute the articles economically distinct commodities of transport, and the transport service cannot be conducted economically except for both commodities together, the production must be regarded as one at joint cost.[1] The separate prices are determined by the relative demands. Of course the sum of the rates must cover the joint costs of production, and if the rate of return to the capital involved is beyond what can properly be regarded as normal, the question as to the general level of the rates is open to discussion.

Ripley's second sub-division of the oyster case is really not directly related to the Hadley case, but represents a distinctly separate set of conditions. X is now supposed to be a way station on a continuous line of railroad between Y and P, the supposition of alternative routes disappearing. However, the same reasoning applies. For simplicity of argument, assume that there is no traffic passing over the line save oysters from Y and X. In so far as this traffic may properly be regarded as joint, any rate necessary to secure consignments of oysters at Y is justified provided that separable expenses are covered by the rate, including a normal rate of return upon separable capital, and provided further that the rate charged at X plus the necessary rate from Y (necessary to secure the traffic) gives the rate of return upon the capital required to handle the combined business. The rate at X may possibly be equal to or higher than the rate at Y, but if a lower rate at X than at Y would so increase the traffic at X as to maximize the profits of the business, then neither economic theory nor business policy would justify the assumed rates at X, even though loss of business at Y might result.

In further discussion, Dr. Ripley says that when the factor of commercial competition is introduced Hadley's analysis of the oyster case is quite inadequate and he goes on to ask whether it would make any difference if the controversy concerned rates in the opposite direction, from P to X and Y—in other words, from a common center of distribution or manufacture to competitive consuming or jobbing points. So far as the mere reversal of route is concerned, Hadley's analysis works as well in the one direction as in the other. The alternative route fixing the rate to Y at one dollar, the possibility of X securing the half-carload of the commodity, all that it can consume, depends upon the concurrent loading of a half-carload for Y in the same car at 75 cents, the cost of transportation from the railway terminal at X to Y being 25 cents. Of course, if by lowering the price to 75 cents, the demand at X would be so increased as to enable the whole expenses of its traffic to be met, including the customary rate of return upon the invested capital, sound economic policy would demand this course to be pursued; and it is pursued, even by strict monopolies. With the Hadley conditions in mind, our author unduly disturbs himself about the economic effects upon X and Y. However, there is a more complicated case in which these effects are more insistent for recognition. In this case the traffic to or from P moves from or to X and Y along separate routes, there being no question of movement of traffic between Y and P, via X. Ripley tells us that methods of rate adjustment in such a case must differ according to the length of line, the direction and composition of the traffic, and other factors. The other factors, he might have added, may be very important. All economic conditions being the same, and joint cost not entering into consideration, the conditions favor the application of distance rates. But differences in intensity of demand, in consuming capacity and productive ability, the intrusion of competition, very frequently bring modifications which make such rates inapplicable without restriction of general material progress. Under these circumstances a demand rather than a cost adjustment of rates is required by economic welfare. But this does not mean that the interpretation of demand is a matter of arbitrary whim on the part of the railroad. In so far as the state, combining in itself both consumers and producers, can assist in this interpretation, its supervision is economically justified.

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[1] Note, however, that, considerations as to train-load haulage etc. being left out of account, three-quarters of a carload from Y could not be regarded as a joint product with the half-carload from X, since its carriage would necessitate another car.

A study of the influence of competition upon railway rates necessarily calls for a broad survey of the nature of the competition. As Dr. Ripley points out, three kinds of competition among railways may be distinguished, namely, competition of routes, competition in facilities and competition of markets. Where competition in routes exists, consolidation (or pooling where such is permitted) is very likely to occur, as in the case of the West Shore and Nickel Plate railroads absorbed by the Vanderbilt lines. Mr. Ripley quotes with approval Weyl's statement that "strictly speaking, permanent competition can exist, not between railroads struggling for the same traffic, but solely between those railroads which have no territory in common." Weyl's statement, however, is one of those generalizations that need careful interpretation. To quite an appreciable extent, the Northwestern, the Milwaukee, and the Burlington are struggling for the same traffic, and yet one would hesitate to say that competition is not exceedingly active between them. It might be urged that in this case the struggle is based on competition of facilities and not on rates, since rate-making by freight associations is characteristic of this territory, as elsewhere. But even in ordinary industrial competition, long periods of steady wholesale prices are by no means infrequent. Such a condition does not necessarily indicate absence of competition. It is the potential price differentiation that is determinant. In the case of the railways named, this potential rate differentiation exists at all times, and its influence is profoundly felt in the meetings of the rate associations and committees from time to time. Especially must it be noted that, where lines competing for the same business become part and parcel of larger systems, conditions of competition may be continued indefinitely.

The most valuable contribution of Ripley to the subject of railway competition is his discussion of market competition. The significance of market or regional competition in the construction of railway tariffs has been receiving far from the study that it deserves. Much further investigation will be required before our understanding of the relationship can be said to be complete. But Mr. Ripley's able discussion ought to help a great deal. Market competition, it is pointed out, is in many cases more than a euphemism for railway policy; although indirect and often obscure, it is of fundamental and conclusive importance in the determination of freight rates. The general effect of rates made under this stimulus has been, not to create differences of opportunity between individuals, but to generalize economic conditions and equalize prices throughout wide areas. Where this competition is of the primary or direct variety, in effect where the commodity undergoes no physical transformation between producer and consumer, the question is simply whether, as regards a certain traffic, this or that supply area, or both, shall feed the demand of a particular consuming area. Shall Maine or Michigan potatoes, or both, supply the New York market? However, the competition may be secondary or indirect where the commodity in question undergoes some change of form, and where the question of competition against rival supplies in the consuming area becomes one of the adjustment of the "interlocked" rates. Such adjustment may determine even the specific geographical location of an industry with reference to the raw material on the one side and the market on the other.

Particularly in the jobbing business are the highly complex details of commercial competition to be seen. The existence of cities as commercial centers may depend upon the adjustment of car-load rates into them and less-than-carload rates out of them. Market competition has led to a wide acceptance in American railway transportation of the principle of the flat rate, by which competitors for a certain market are placed upon an equality, so far as the transportation charges are concerned. This is very undesirable where it penalizes or nullifies advantages of location.[1] Conditions may occur, in fact commonly do occur, in connection with market competition that prevent any individual line from determining the rate; its rate is determined for it. In fact, it may be said that an important feature in commercial competition is its entire dissociation from all considerations of cost of service by long or short routes. Such a statement, by the way, while not exactly erroneous, certainly has the defect of incompleteness. It is true that the price of sugar at Kansas City, to take Ripley's concrete example, is made by competition of sugar from several parts of the world, and that no particular line makes the rail rate. Yet, undoubtedly, the cost of rail transportation enters into the price of sugar at Kansas City, and, whatever they may do in sporadic moments of excitement, railways will not continue to carry sugar to Kansas City unless the traffic bears at least the expenses that can be specifically imputed to it. If an indefinite quantity of sugar could be conveyed over any one of the routes, and that route could convey it more cheaply than other routes, there would tend to result a concentration of the traffic on that line. Under competitive conditions such a line could stand rates that would mean actual loss to the other lines. The latter might fight for a compromise, but that the compromise would be a rate favoring in some degree the strong line can hardly be doubted.

In price making where the conditions of supply are not those of competitive joint production, but of monopoly, the inferior and superior price limits are set by cost of production on the one hand and maximum net return on the other. The law of increasing returns, if operative, tends to restrict the superior price by reason of the reaction of the former, through demand, on the maximum net return. Competitive joint-cost production is itself appreciably more confined in its power of fixing the combined prices of its commodities; yet, within the limits enforced by this restriction, it may be said to exhibit more flexibility of price adjustment than does monopoly. Both joint costs and monopoly have a certain similarity, in that price-making under either system is very strongly influenced by marginal demand. The wider the area over which "jointness" holds good—in other words, the greater the number of commodities that are produced jointly—the more difficult it is to determine whether discriminatory prices arise out of joint production or monopoly. The phenomenon is modified somewhat when separable expenses have to be taken into account, but it is not essentially changed. The problem of price-making in railway transportation is made especially complicated by the fact that varying degrees of monopoly, competition, joint cost, are apt to occur. Consideration of the working of competition, both junctional and regional, forces one to the conclusion that the theory of pure monopoly, as also the theory of perfect competition, is inapplicable to railway rates as a whole, that what is needed for better comprehension of their adjustment is a thorough investigation of the theory of limited monopoly and its bearing on maximum economic welfare. One will find in such a study, probably, a certain reconciliation of the views of such writers as Taussig, Pigou and Edgeworth, for at times it will be found necessary no doubt to appeal to the theory of joint costs for an adequate interpretation of particular rate discriminations, just as at other times the assistance of the theory of monopoly must be sought. Take the case of traffic to so-called non-competitive points. It is common to speak of this as though it were purely monopolistic. Yet, under the actual conditions of rate-making, it is very likely that competitive influences frequently affect such traffic indirectly. In so far as the long and short haul principle is observed (and this is true of most of the traffic of the country) the cutting of the rate at competitive points lowers the maximum that can be applied to non-competitive points on the same route, and, not uncommonly, causes more or less distribution of the reduction over some, at least, of the antecedent non-competitive points. Where the long and short haul principle is not observed, this does not hold true, but even here it is possible that at times the establishment of the rate to the local point upon the basing-point rate, forced to a low level by the influence of strong competition, may actually provide the former with a rate below that which it would have secured if the economical centralization of traffic stimulated by the basing-point rate had not been in effect. This is still more likely where the rate to the local point is made up by the addition of an arbitrary, lower than the normal, local rate, to the through basing rate.

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[1] This is not discussed by the reviewer in this place, as brief attention is given to the question of the distance factor on a later page.

Moreover, most railroads, eager though they be for large through traffic, cannot afford to neglect the possibilities of local traffic. There are numerous small industries, occasionally something more than small, situated at local points, but competing in the markets with the products of similar industries on lines serving other localities. Under these conditions, pressure is likely to be brought to bear by such manufacturing concerns to secure rates for their shipments which place them in a favorable position as compared with their rivals. The fact that, under such conditions, the competitive factor is somewhat slow and obscure in its operation must not prevent us from recognizing its existence.

There is great need for close observation of the phenomena of local rates in order that the true measure of the respective parts played in their construction by monopoly and competition may be taken. The most serious attempt so far to make any detailed examination is that of Professor J. M. Clark, whose interesting study of local discrimination has much merit, though leaving many points at issue. In reading through Ripley's treatment of rates, one cannot avoid a feeling of disappointment that so important a field, doubly so in that it has been neglected, should not have received more generous cultivation at his hands.

But if the theoretical problems of local discrimination (in the broad sense) still remain to be solved, Ripley's explanation of the facts of discrimination is both interesting and enlightening. Reference having already been made to certain points in his discussion of local discrimination, the present discussion may now be restricted to the question of personal discrimination.

Local discrimination may at times be personal discrimination in disguise, and therefore clearly unreasonable. This is shown very effectively in a Standard Oil case that Ripley draws from the well-known petroleum report of the Bureau of Corporations. In this instance, specially low rates were made from Dalton, Illinois, near Whiting, Indiana, to Grand Junction, Tennessee, to favor the Standard Oil Company in its competition with independent producers for the trade of the Southeast. The issue of the regular oil tariffs from Whiting was obviously nothing but a blind to cover the special tariff from Dalton, legally but unobtrusively filed. Personal discrimination, as Ripley shows, easily becomes hydra-headed. Excessive allowances on private cars, extravagant pro-rating agreements with industrial lines, sophisticated commodity tariffs, midnight tariffs etc.—such was the outcrop of a low morality permeating the circles of both shippers and carriers. With the attainment of greater economic equilibrium and improvement in the standard of business morals, amelioration of these abuses would have ensued, unquestionably; but we can agree with Ripley that the coöperation of the law has been of stimulating effect. In spite of some conspicuous reversions to old methods, there has been marked improvement. As to how important a factor of further advance, endorsement of pooling agreements would be, is far from certain. Common action by the railways, without such arrangements, has developed so far that any additional benefit to be gained from pooling in this regard might easily prove to be less substantial than our author apparently expects. He fails to tell us to what extent personal discrimination was rampant during the decade of active pooling prior to the passage of the Act to Regulate Commerce. There is evidence to show that there was a considerable amount of it. In a country of rapid industrial growth, pooling agreements necessarily undergo frequent revision, and the temptation to swell traffic and pooling percentages by improper inducements to shippers is apt to make itself felt.

The details of Ripley's admirable description of the methods of personal discrimination call for but minor criticisms. In connection with private car lines he is concerned mainly, of course, with their record as rebating media, but this very limitation is apt to leave with the uninformed reader a rather inadequate idea of their purpose. It would have been well to point out clearly that their development was a very natural one, arising out of the attitude of the railways, and that it was of much advantage to the latter. The economy to each individual road of not having to provide large quantities of cars available only for special traffic, or at particular seasons of the year, is an economic justification of the system. That mileage adjustments need to be made very carefully on privately-owned equipment and that care must be taken not to allow such payments to become subterfuges for rebates needs no debate. In the past such rebates have been altogether too prominent. Yet, curiously enough, the figures for 1903 quoted by Mr. Ripley do not reveal any extravagant profit upon private cars as a whole. A mileage payment of $12,000,000 upon approximately 130,000 private freight cars indicates roughly a ten-per-cent return. When depreciation and repairs are allowed for, the return upon the capital invested must have been less than five per cent. In the recent inquiry into the private car system, the packers, Morris and Company, asserted that the return upon the capital investment in refrigerator cars amounted to 4.71 per cent for 1912. There have been special cases, no doubt, in which the rate of return has been considerably higher, though the examples depended upon by Ripley to establish this are not altogether free from the suspicion of exaggeration, despite the distinguished authority from which they are drawn. It is hard to believe that, for so long a period as two years, in spite of loading and unloading delays, repairs etc., an average of one hundred and fifty miles per car per day, for every day of the period, could have been obtained by any private car line. That the extraordinary sum of $200,000 should have been secured during the specified two years by the 250 cars in question would induce one to suspect corrupt practices for which the mileage-allowance accounts served simply as a cover.

Mr. Ripley's discussion of the Peavey Elevator case, well known to students of the decisions of the Interstate Commerce Commission, also needs brief attention. The Commission, after upholding the legitimacy of the elevation allowance for the transfer of grain from Union Pacific cars at Omaha, subsequently changed its mind, on the ground of changed conditions, and declared them unlawful. This action both the circuit court (176 Fed. 409) and the Supreme Court (222 U. S. 42) declined to ratify. The opinion of the circuit court enters very carefully into the merits of the argument of the Commission. Probably Mr. Ripley read this opinion, but, no doubt over-influenced by the comment of the Commission upon the court decisions, does not give it all the weight that it deserves. There was a powerful reason why the Union Pacific Railroad should foster, so far as it could, the transfer of grain at Omaha, for, to the extent to which this could be done, it was a distinct operating economy, reducing the number of cars that passed from its own lines and increasing its carrying capacity during the active period of grain movement. The railroad could perform this service through elevators of its own: the mere fact that it preferred to make use of private elevators could not, of itself, create undue discrimination, if the elevator allowance were no more than a reasonable payment for the actual service performed, and, especially, if the allowance were receivable by all elevators able to perform the service with satisfactory efficiency (see 222 U. S. 215—Updike grain case). It is easy to see why elevator allowances did not appeal to those St. Louis roads with lines both east and west of that city, since their mileage enabled them to maintain more effective control over the movement of their cars than was possible to a line like the Union Pacific, terminating at the Missouri river, if its cars passed from its own lines to some independent connection. Only by such a device as that adopted by the Union Pacific could the line without the through connection relieve itself of the operating disadvantage. The fact that through lines crossing the Missouri river at Omaha and other points put in corresponding elevator allowances, did not destroy the justification of the practice so far as the Union Pacific was concerned. In passing it may be noticed that, after mentioning the action of the Commission denying the reasonableness of these allowances, Ripley still finds it possible to say that the decision of the Supreme Court upheld the Commission in holding that the payment of an elevator allowance was not unlawful.

The record of American railway rate-making has been marred by unjustifiable rate manipulation arising partly out of low commercial morality, partly out of inadequate experience of railway traffic managers, and lack of breadth of view. In spite of this, much success has been attained in interpreting the significance of economic conditions, as a result of which extremely valuable assistance has been rendered towards the rapid and effective utilization of the material wealth of the country. If the reviewer reads Professor Ripley's pages rightly, such is his attitude. However, he feels that, in some respects, competitive conditions have been allowed to exert too powerful an influence upon rate-making. Instability of rates has been fostered with certain resultant evils, which, with him, we shall now discuss.

First of all, he draws attention to the large number of railway tariffs, and urges that the best proof that they have been unduly numerous is the great reduction in volume that has taken place, since 1906, under compulsion of law. There can be no question but that, in years gone by, there has been excessive complication in the publication of tariffs and that the coöperation of a body like the Interstate Commerce Commission has facilitated their simplification. However, Mr. Ripley's data does not, as he apparently supposes, prove a remarkable reduction in the quantity of commodity rates. The figures that he quotes are simply those of separate tariffs issued. But important practices have been developing that, in themselves, tend to reduce the number of separate tariff issues, yet do not necessarily reduce the number of rates. These are the broadening of tariffs so as to cover more commodities, or wider territories, the increase in agency tariffs, thereby avoiding separate publication by individual railroads, and the use of elaborate "exceptions to classifications" which obviate the use of a considerable number of commodity tariffs by the railroads, as well as render unnecessary separate publication of such tariffs by individual roads. Mr. Ripley's statistics may be used well enough to indicate greater simplicity in the publication of tariffs, and this is a very real gain; but they are of little value as bearing upon the question of reduction in the number of rates, the only issue to be considered when discussing the matter of elasticity of rates.

In the second place, Mr. Ripley urges that elasticity in freight rates may at times be used so as to promote rather than to lessen the state of economic unrest inevitable in business. The undesirability of this is beyond contradiction, but the reviewer does not understand that, to prevent such excesses, Professor Ripley would have set up some rigid form of rate adjustment. The weakness of governmental rate-regulating bodies is that they are very apt to seek a standard yard-stick which will have the magical property of settling all their difficulties in the measurement of reasonableness. Under the color of stability of rates, they may deprive a most powerful agent of economic advance of all initiative and vitality. It is to the credit of the Interstate Commerce Commission that it has endeavored with some success to keep itself free from this weakness, though there is some reason to wonder whether this policy is likely to be continued for long.

Thirdly, flexible rate-making has enabled rates to be made with the purpose of merely wresting business from other carriers or markets. "These are the expressions of railway ambition to build up trade by invading territory naturally tributary to other railways or traders." Superfluous transportation—economic waste—has resulted. Several examples of such economic waste are quoted, based on the supposition that whenever a community producing a surplus of a given commodity supplies itself, nevertheless, with that same commodity from another market, economic loss results. Here, as in certain other places, Mr. Ripley's estimate of the social advantage of competition seems surprisingly low, and out of harmony with his own general position. Probably in the majority of instances cross competition has a very beneficial effect upon the prices to consumers and upon the level of efficiency of producers. There is a very real gain, which must be set off against the apparent economic loss produced by the cross movement of freight. Moreover, the economic organization that sometimes causes the movement of the products of a district to some external market, only to be redistributed again through the same district, is not to be lightly dismissed as the sponsor of inefficiency. The advantages to be gained at times from the centralization of the distribution of goods are undeniable.

Fourthly, the unduly elastic rate system may entail increased burdens upon the local constituency of each railway. America has fifty per cent more special rates than England. The figure is a guess, but, letting it go, the fifty-per-cent increase may not be out of proportion to the greater dynamic vigor of a new country such as America. To continue our author's argument: "Momentous social consequences may result. Not only the cost of doing business, but the expense of living in the smaller places is increased. One of the most dangerous social tendencies at the present time is the enormous concentration of population and wealth in great cities." The author does not directly charge the American rate system with having, by its undue elasticity, brought about these momentous consequences; but his hint as to the excessive percentage of American special tariffs compared with those of England makes the inference inevitable. Should he not have given us therefore some estimate of the effect upon cost of living in the smaller places that could possibly be produced by the removal of undue elasticity from the railway rate system? His reference to the dangerous tendencies of centralization is open to a similar question. Perhaps enthusiastic appreciation of the achievements of railway transportation has induced an over-generous estimate of the extent of its social influence.

Fifthly, an abnormal disregard of distance, which is always possible in the making of special rates to meet particular cases, may bring about a certain inelasticity of industrial conditions by hindering the rise of new industries or by postponing or averting the well-merited relative decline of old ones. But a greater insistence upon the rights of geographical location might with equal effectiveness bring about this economic retardation. The argument cuts both ways.

The last item of the preceding catalogue of evils, abnormal disregard of distance, is the occasion for the inclusion of a separate discussion of the causes of economic waste in transportation, six of which are named as prominent by the author: (1) congestion of the direct route, (2) rate-cutting by weak circuitous line, (3) pro-rating practices in division of joint through rates, (4) desire for back loading of empty cars, (5) strategic considerations concerning interchange of traffic with connections, and (6) attempts to secure or hold shippers in contested markets. Some of these are of mere academic interest. As regards (1), it may be more economical from the point of view of society, for the time at least, that freight should be carried by a circuitous route in which capital has been already invested than that new capital should be laid down, in the expansion of the congested route, considerably in advance of its full utilization. Nor is rate-cutting by circuitous lines (2) to be regarded too seriously. The competition of circuitous lines has produced some obvious excesses, at times fostered by unhealthy pro-rating practices (3), but, on the whole, there is good reason to regard the restriction it imposes upon monopolistic price-making by the direct route or associated direct routes as beneficent, and, as has been pointed out previously, there is always the possibility that the reaction upon the railways will conduce to greater technical efficiency. The attitude sometimes assumed by railway traffic men, and apparently approved by Ripley, that traffic between any two points "belongs" to the direct route or routes, is a dangerous one. Economic waste cannot be determined solely by the money costs of working traffic over the different routes. Where the circuitous route coincides with favorable conditions of back-loading the competition with the direct route may become very keen indeed, but a circuitous route favored by such traffic conditions has some ground for insisting that it is, under these circumstances, one of the prime factors in the establishment of the rates in question. In such cases it very frequently happens that favorable back-loading conditions are present on both the direct and circuitous routes, a fact that eases, for the direct route, the severity of the competition.

If the foregoing criticisms are well-founded, then circuitous routing is hardly as serious as Ripley's indictment would lead us to believe. Five resulting evils are named by him : (1) inordinate swelling of the volume of ton mileage, (2) dilution of ton-mile revenue, (3) rigidity of industrial conditions, (4) fostering of centralization both of population and industry, and (5) the imposition of a tax upon American production. The last three are the only ones that call for consideration, and (3) has already been considered in another connection. If real economic waste occurs, all factors in the case, and not merely the question of direct versus circuitous routing, being taken into account, we need not hesitate to agree that such a tax upon the productivity of the country should be avoided, in so far as it is capable of being foreseen. The fourth item Mr. Ripley does not discuss, though one or two scattering references to it occur in the volume. The reviewer must follow his example somewhat, for the problem is too large a one to be dealt with adequately in this article. What follows is simply intended to emphasize the difference of opinion that prevails on the matter. It is interesting to note that, discussing the third item, Ripley gives the following illustration, which seems to show some hesitation as to the validity of the fourth count of his indictment. "If Pittsburgh is the natural center for iron and steel production, it may not be an unmixed advantage to the country at large, however great its value to New England, to have the carriers perpetuate the barbed wire manufacture at Worcester." Professor M. H. Robinson, in his able attack upon the economic disadvantages of the present system of rate-making, urged as one objection that the system checked the normal tendency towards concentration of production in those localities most highly favored by nature, and thereby increased cost of production. When doctors do not agree with one another, or even with themselves, what is the uninstructed layman to think? A certain tendency towards centralization is commonly regarded as economically and socially beneficial, in spite of the evils that may result from the aggregation of human beings in urban centers. To take the liberty of repeating a statement made by the reviewer in a previous article :

> A rate system, constructed and applied in such a way as to reduce all industries wherever situated to a dead level of profits, would militate against

localization and would tend to maintain a higher cost of production. But such rate-making is a far-fetched hypothesis, justified neither by the history of the past nor by a reasonable anticipation of the future. The existing rate system shows no tendency to alter the natural lines of industrial progress. Under its influence, the farming of New England has been transferred to the more fertile fields of the Middle West, and, in its place, there has been built up those manufacturing enterprises for which it was marked out long before the railways appeared. The lumber industry of the Northwest has been developed concurrently with that of the Southeast. Centers of trade such as St. Louis, Cincinnati, Cleveland, Chicago, Omaha, and many other cities, highly favored by nature, except in the matter of proximity to the Atlantic Coast, and ear-marked for industrial advance before the railways reached them, have not failed to make the most substantial kind of growth. It is true that localization has not been developed to the last degree of physical concentration, and that the present rate system permits a certain diffusion, but it is a gratuitous assumption to argue that this means a higher level of cost. The economic theory of production does not justify the supposition that the cost of production curve continually falls as localization develops. There seems good reason to believe that, after a certain degree of localization is attained, the cost curve is not appreciably affected. Under the railway régime of this country, localization has developed in localities with particular advantages of production or distribution, very often rather the latter than the former : as the tide of population has flowed westwards, other localities, often enough with still greater advantages of production, have been relieved of their relative disadvantages of distribution, with the result that they, in turn, have become points of localization. Thus much of what appears to be diffusion is really experimental localization in a country still in the stage of regional development. In a vast territory such as the United States, it is evident that, for many industries, there are several localities offering, for their own areas, at least, special advantages for the indissolubly related processes of production and distribution. Indeed, apart from the consideration of stationary cost after the attainment of a certain intensiveness of localization, the desirability of some diffusion of industry must surely be admitted. Complete concentration of any industry would mean, in general, an increased average distance of transportation for the products of that industry and, quite possibly, for some of the raw materials and fuel. The advantage to the consuming community of the lower cost of production at the point of concentration, if such existed, might easily be neutralized, in whole or in part, by the higher freight charges arising from the greater average distance of carriage. Furthermore, the more complete the concentration, the stronger would be the tendency towards combination and monopoly, again with possible inimical effects upon the consuming interests.[1]

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[1] Rate-making and Rate-reforming, *Railway World*, March 11, 18, 25, April 1, 1910, p. 198.

All the foregoing considerations point pretty clearly to the nature of the underlying general principles of rate adjustment. In the words of our author, both cost of service and value of service must be continually invoked as a check upon each other. "Neither will stand the test of reasonableness alone. Whether the one or the other should take precedence can only be determined by a careful study of the circumstances and conditions in each case." If for each class of service, economically distinguishable as such, the actual total cost assignable to each unit of service under conditions of free competition, including earnings of management and return to capital, could be made the measure of each rate, then rates so adjusted would probably be the most desirable from the point of view of maximum economic welfare. This much may readily be granted to the theory of cost-of-service rate-making. But, as Edgeworth has pointed out, with so complex a system as that of railway transportation, how can we ascertain in the absence of free competition what would be the charges fixed by it? Theory must bow to practice, and hence in attempting to use cost as a criterion of rate reasonableness we must be satisfied with the less significant cost of movement, interpreted, perhaps, as mere out-of-pocket expenses, and consequently applied with a very large allowance for error. Below this level rates should not go, because traffic so secured would cause an actual reduction of the surplus available for the overhead and more constant charges. Where conditions of competition are very keen, rates tend to be driven down to or near to the level of their prime costs, with consequent reduction of their contributions to supplementary costs. While such rates are easily defended from the standpoint of the particular interests of the individual road, they are not to be justified so readily from that of general economic interest, unless they are indispensable to the development of new business. In the consideration of rates upon established business, the point of emphasis should be, as Lorenz suggests, those expenses which would not now be incurred if the traffic had not been called forth, and, so far as these can be identified, they should be regarded as fixing the lower limit of rate adjustment.

While the lower limit of charges can be indicated, not by any means with precision, but still with some pretence to definiteness, the same cannot be said of the upper limit. Ripley takes considerable pains to show how the relative insignificance of the transportation charges, as compared with the value of many goods, makes it impossible to look in these cases to the principle of charging what the traffic will bear for protection of the consumer from exorbitant rates; such cases must be settled with "some reference, indefinite though it be, to the extra cost incident to the particular service." If the question had been one of minimum rates, the economic propriety of such a solution might have been conceded. Within considered limits the comparison of relative extra costs might be allowed to be of service in helping to fix rate relations. But what the logic of its employment in the determination of maximum rates can be, is difficult to understand. The question is complex to a degree. Are we to suppose that the railways have deliberately neglected an obvious and easy opportunity of securing an appreciable increase of revenue? The unlikelihood of such a supposition induces one to believe that some powerful force has compelled the maintenance of rates on high-valued goods at a comparatively low level. Without doubt a partial explanation at least is to be found in the territorial extensiveness of the market for the higher-valued products, permitting competition, particularly market competition, of special intensiveness. So long as this continues (and it is likely to do so) there will be effective a powerful check upon any large and general increase of a permanent nature in the scale of transportation charges applying to these commodities. But, supposing that the rates on such goods could be considerably enhanced without effect on the present or future demand for them, does it follow that rates raised to the maximum level would be exorbitant or extortionate? Is there any logically acceptable criterion of the reliability of maximum rate schedules other than that of the effect upon demand (including future demand, so far as it can be measured in advance)? Perhaps such a criterion may permit distinctly monopolistic profits with consequent justification of a readjustment of the general level of rates; but this is another matter.

Though Professor Ripley may be inclined to estimate rather highly the value of cost of service as a check, his general argument would by no means meet with the approval of strict cost-of-service theorists. From their point of view it is open to serious criticism. For instance, as one of the reasons for attributing theoretical unsoundness to cost of service as a sole rate basis, Mr. Ripley makes the assertion that its application would hinder all transportation of low-grade traffic, and would prevent any development of long-distance business. Cost-of-service advocates would reply that this would be a distinguishing merit, for one of the evils of the present system with its low rates for low-priced goods and high rates for high-priced goods, is exactly that it encourages the country "to use more of the goods which it needs less because its wants are more fully satisfied, and less of those which are in greater demand."[1] Further, Mr. Ripley passes unnoticed the argument that this system of charges would tend to leave in the hands of each producer the economic rent to which his location or ability entitles him, whereas the current system tends to allow the railways, as they secure monopolistic unity among themselves, to sequestrate such rent. Moreover, Ripley's argument in favor of regarding cost as indeterminate would be open to objection in several particulars. As previously noted, more proof of the importance of the factor of joint production would be demanded. A large mass of the supplementary expenses, it would be urged, can with economic justice be allocated in proportion to marginal costs, and the size of the indeterminable factor would be too restricted to cause any significant error. Variability of cost and fluctuation of volume would not be admitted as prohibitory of adjustment of rates to costs—in any case, it would be contended, it is not the variant cost of individual units of traffic that has to be determined, for price under permanently competitive conditions is not affected by the incidental fluctuations of unit price, but simply by the average cost of recently produced units.

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[1] See article on "Freight Rates," M. H. Robinson; *Yale Review*, 1909.

Whatever may be lacking in this particular part of Ripley's discussion, one excellent merit stands out. Appreciative as he is of the difficulties arising in connection with a flexible rate system, optimistic, perhaps, as to the extensibility of application of the cost-of-service idea, he never allows himself to lose sight of the fundamental importance of value-of-service considerations under the progressive conditions of American commerce and industry.

As the basic purpose of this article is the discussion of the more theoretical aspects of the rate problem, the writer will content himself with but brief reference to Ripley's substantial description of the rate structure built up by American railways. As a succinct description of its characteristic features, the study is unsurpassed. There are some errors of statement, but they are not serious enough to detract from the high excellence of the general treatment. The problems of freight classification are brought out very clearly, and the practicability of uniform classification is discussed with entire fairness. Perhaps a little more emphasis might have been placed upon the efforts of the railroads themselves in the direction of greater uniformity of classification. Before the establishment of the Interstate Commerce Commission, much thought had been given by them to the problem and, indeed, much was accomplished. If the Act to Regulate Commerce had never been passed, the movement would still have continued, though that piece of legislation was undoubtedly a stimulus.

" Rule-of-thumb is mainly represented," says Mr. Ripley, " in classifications of the present time; that is to say, an adjustment of freight rates upon different commodities to suit the commercial conditions which have happened to prevail at any given time: all of which emphasizes still further the need of scientific revision of these most important schedules." It is not clear what is meant by scientific revision in this connection. During the last half-dozen years or so, a great deal has been done in the way of overhauling the classifications. Inconsistencies and improprieties have been found, but no one familiar with actual classification practice can resist the conclusion that the classifications have been pretty well adjusted to their economic environments, and that the efficiency of this adjustment has been promoted by the fact that the classifications have been the growth of rule-of-thumb experience. They were haphazard in their origin and, in rough and ready fashion, they have been shaped to fit business conditions. Economic expediency has been the guiding principle, but it has brought about what is, on the whole, a working compromise between the various interests involved. To quote the Interstate Commerce Commission in the Forest City Freight Bureau case: "Classification is not an exact science, nor may the rating accorded a particular article be determined alone by the yardstick, the scales, and the dollar."

In the actual construction of rates, systems of percentages, basing points or differentials may be employed. The first-named plan has been worked out so successfully in the case of the through traffic of the territory north of the Ohio and Potomac rivers and east of the Mississippi that it has attracted general and well-merited attention. Several years ago, Mr. Ripley worked up the leading details of the Trunk Line Percentage System into an interesting article which has now been made more accessible by inclusion in his treatise. He makes the Trunk Line System serve as an object lesson of the practicability of a more extensive distance tariff, but he lays hardly sufficient emphasis on the peculiarly favoring conditions of this territory. The competition of the Great Lakes, the disturbing influences of the western railways in the grain traffic, and also of the numerous transverse north and south lines, the rough parallelism of the dominating lines, a fairly regular distribution of markets from west to east, the general diffusion of traffic among the smaller towns, all of these combined together to make the application of a simple rate scheme successful to a degree that was unattainable in other parts of the country. Mr. Ripley himself draws attention to the considerable irregularities that prevail under the scheme; if he had inquired further, he would have found that when an attempt was made in the revision of the scheme, subsequent to the enactment of the interstate commerce law of 1887, to lay greater emphasis upon the distance factor, serious economic disturbance and loss resulted, so that a further revision had to be begun, in 1892, to take more carefully into account industrial and commercial conditions. This resulted, according to McPherson, in an adjustment under which "the rates as a whole bear only an indirect relation to distance." There are frequent instances of the use of arbitrary rates, of special percentage groupings etc.

Turning to the basing-point system of the South, Mr. Ripley finds it a medieval scheme of rate-making. But the Interstate Commerce Commission, in spite of its dislike for this system of making rates, found itself unable in its decision of April 13, 1914, to change its fundamental features. To a large extent—and in saying this we do not dispute the fact that, at times, an extravagant use of the basing-point principle has been made—the system has naturally developed out of the economic conditions in the South and in course of time has become inextricably interwoven with the economic structure. The feeling of the railroads is well indicated in the brief of one of the petitioning companies before the Commission, in which it was stated:

> To have a vast system of rates, such as the Southern rate fabric, suddenly and utterly all altered; to have the system of rates in use and operation from the Mississippi to the Coast and the Ohio to the Gulf, a system which has resulted from fifty years of strife and competition and compromise among the Southern railroad companies, the result of the best thought and labor of many of the greatest railroad men the country has produced, a system which has given and is giving general satisfaction, that is eminently practical, and entirely lawful—to have all this shattered at one blow into wreck and dissolution, is no small matter. To revolutionize the long established business conditions of the South, and the channels of trade of the South, is an equally important thing. And to force such radical reductions in the rates and revenues upon the Southern railroad companies as will probably bankrupt some of them, and inevitably and materially injure all of them, is still of greater magnitude. Yet all of these will undoubtedly result from a literal enforcement of a long and short haul rule of the fourth section of the Act to Regulate Commerce.

Unfortunately, Professor Ripley's volume was published a couple of years before this discussion, or he might have been a little more charitable towards the Southern rate system.

Finally, as regards the movement of freight rates since 1870, Ripley points to the great fall in the ton-mile revenue curve between that date and the close of the last century, and the apparent cessation of the downward movement since about 1897. But it must be borne in mind that this curve is not altogether an accurate register of rate movement, for, as Ripley observes, revenue per ton-mile is affected fundamentally by three distinct sets of conditions, varying according to the nature of the traffic (high or low grade), length of haul and proportion of through business and volume of traffic handled. Mr. Ripley's logic is not quite clear here. The first two conditions may affect, in a very direct way, the interpretation of the ton-mile curve, but does the third do this? Of course volume of traffic favors reduction of rates, but, " entirely irrespective of any change in the level of the rates," how can it "profoundly" modify revenue per ton-mile.

From about 1900 there has been, Ripley states, a substantial rise of charges, mainly, in 1900 by changes in the class ratings; in 1903 by advances in certain commodity rates, affecting iron articles, packing-house products and dressed meats, bituminous coal and coke; in 1907–8 by advances on grain and grain products, coffee, sugar, also further increases in the coal and coke rates. These advances, covering a large amount of tonnage, seem to have been forced by large increases in operating expenses, a point of interest which is not discussed in the text. The increase of class ratings in 1900 was, perhaps, counterbalanced by subsequent reductions. Reference should have been made in this connection to the evidence supplied in Mr. C. C. McCain's pamphlet on "The Diminished Purchasing Power of Railway Earnings," published in 1909, in which it is pointed out that between 1898 and 1908, a period roughly coincident with Ripley's decade, there were 638 advances and 296 reductions in less-than-carload ratings, 259 advances and 580 reductions in carload ratings, and that on the basis of the shipment of 100 pounds of each of the articles affected, from New York to Chicago, the effect on revenue would be: for the former, increase $69.97, decrease $71.35; for the latter, increase $27.05, decrease $129.72½. There were available no statistics of volume of movement for the different classified articles, but Mr. McCain notes that "the preponderance of decreases is in articles which contribute most largely to the total tonnage while the reverse is true as to the greater number of increases in classification."[1] We may also note, in general corroboration, the statement made in the carriers' brief in the five-per-cent rate case:

> The deduction from the history of the classification during the period of 23 years [1887-1910] is that there has been a general downward tendency in

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[1] Page 43 of the pamphlet.

both carload and less-than-carload ratings, which was only partially arrested by advances made by the carriers in 1900, while the six classes in the official classification have carried the same rates since 1887.[1]

There are some evidences of inadequate revision of this chapter on rate movement. Dr. Ripley tells us that the tendency towards higher-grade tonnage has been notable, especially since 1900, though, on the previous page but one he has laid considerable emphasis on the fact(!) that a steady increase, relatively, in the volume of low-grade traffic has long been under way. Again, relying upon a table taken from the report of the Senate Finance Committee (1893), giving the percentage of tonnage in each class of westbound freight on trunk lines, for selected years from 1878-1892, he proceeds to point out, for instance, that fourth-class freight, during the fourteen years covered by the statistics, decreased from 57.9 per cent to 10.4 per cent, while sixth-class freight increased from nothing to 43.4 per cent, but not a word is said as to how far this change of percentage represents merely a change of classification practice. Further, in discussing local traffic, he refers, by note, to the high proportion of such business in the South, though previously he has allowed a possible defence of locally high rates in that territory, on the ground that local business is scanty. There are other erroneous or confusing statements but they are of insignificant importance.

The unsatisfactory nature of this treatment of rate movement, the final section of Ripley's discussion of railway-rate theory and practice, cannot interfere, however, with the recognition of the great merits of his general discussion. It is certainly assured of a leading place in the literature of its subject.

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[1] Page 4713 of the evidence.